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Gender Differences in Preference for Learning Environment Among Aviation Education Students

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GENDER DIFFERENCES IN PREFERENCE FOR LEARNING ENVIRONMENT
AMONG AVIATION EDUCATION STUDENTS

By

Eric M. Moyer

A Thesis Submitted to the
Department of Human Factors and Systems
In Partial Fulfillment of the Requirements for the Degree of
Master of Science in Human Factors & Systems

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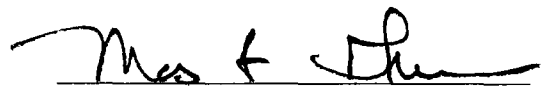
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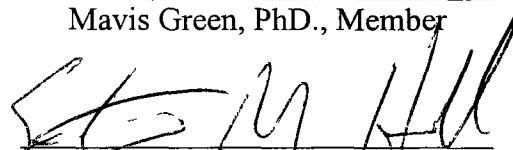
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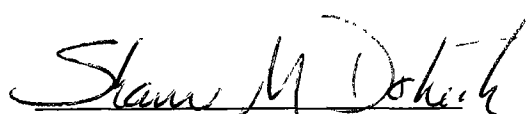
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ABSTRACT

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This study investigated whether differences existed between sex, male and female, for the preference of three different syllabi describing three different learning environments. Learning environments consisted of collaborative, and individual, with the individual sub-divided into competitive, and individual while co-varying participants for credit hours. 264 surveys were administered to students in freshman, sophomore, junior, and senior classes in order to collect preference, and demographic data. The surveys were presented as three fictional syllabi differing only in class grading format, and a paragraph on the instructional philosophy of the professor. Instructional philosophies described the proposed environment of the class by enforcing the individual, competitive, or collaborative instructional methods. According to recent literature, women were predicted to prefer collaborative classroom environments to individual/competitive classroom environments and males were predicted to prefer competitive/individual over collaborative classroom environments. Limitations for the present study were discussed as well as suggestions for future research.

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Introduction

There exists today a substantial amount of literature supporting the notion that college aged men and women do not prefer the same learning method (Civikly, 1992; Cooper & McIntyre, 1993; White, Duda & Hart, 1992; Lewis, Rausch & Goldberg, 1968; Sandler & Hall, 1986; Spitzack & Carter, 1987; Treichler & Kramarae, 1983; Wood, 1992, 1993; Wood & Lenze, 1991). Women tend to place importance on mutual support, and the building of collaborative knowledge, while male learning is based on individual expertise and the presentation and debate around abstract concepts (Kramarae & Treichler, 1990).

These differences in learning preference may be due in part to environments that possess “gender insensitivity”, where instructional content marginalizes, devalues, neglects, or misrepresents the experiences of either sex (Streitmatter, 1994). Teacher’s perceptions about gender often cause them to present subjects to students in ways that coincide with their perceptions of gender appropriateness. That is, curriculum that has been thought of as stereotypically male or female is presented to students in a like manner (Kramarae & Treichler, 1990). This premise expounds the observation that teachers tend to treat male and female students differently (Sadker, Sadker & Klein, 1986; Sadker, Sadker & Steindam, 1989). In addition, researchers have indicated that students often possess internal perceptions about acceptable gender behavior. These internal perceptions bring to the academic environment subtle prejudices about what subjects are appropriate for men and women to learn. For example, male and female students categorize math and science as characteristically male subjects (Fennema, 1985).

If we consider that many of these factors have been affecting the student from his or her earliest experience in the formal education system, they are very likely to reinforce their preferences for learning methods once the student reaches college (Fox, 1989).

To date, the majority of research done on male and female student differences has been applied to the conventional classroom settings of primarily Liberal Arts Colleges, and not to the classroom settings of an Aeronautical University where the curriculum is often heavy weighted with engineering classes. The present study plans to discover if these previously defined, learning method preferences exist in an aviation education environment where there is a strong gender stereotype associated with the curriculum. It will be the goal of this study to determine if male and female aviation education students differ in their learning method preference.

Gender Differences: Nature vs. Nurture

Are men and women different? From a purely physical standpoint the obvious answer is yes. However, human beings are more complex creatures than what their physical semblance would indicate. In addition to physical appearance, human beings differ in behavior. These differences in behavior occur most frequently on an individual level but have also been observed between genders. Thus the argument over gender-differentiated behavior was born, and leads us to ask the question: “Are there truly behavioral differences between men and women, and if so do these differences stem from wholly biological or environmental conditions?” This debate has been termed by many as the Nature (biological) vs. Nurture (environmental) problem. Sadker, Sadker and Klein (1991) have summarized the work of researchers who have examined the existence

of innate or biological differences that would cause men and women to behave differently, and have discovered no evidence to support such beliefs. They indicate that the differences observed in men and women seem to be more realistically the product of environment. That is, men and women are actually taught by their parents, those in their immediate social surroundings, and the media, how to act in a gender specific manner. It is not the place of this paper to examine or argue the origins of gender differentiated behavior but rather explore, and expand upon the position held by the researchers who believe that men and women differ because of environmental learning, or social influence. And subsequently, do these behavioral differences influence the learning environment preference of the student while considering the perspective of the student and the influence of teachers who may possess a gender-biased view of appropriate gender-specific behavior.

Regardless of the nature vs. nurture gender-origin riddle, and the type of behaviors that are characterized as gender specific, the western world does differentiate between male and female appropriate gender behaviors, and it is the perception of these roles that influence social interactions. For any child, one of the strongest sources for these societal interactions is school, and the interaction with teachers, whose behaviors may be influenced by gender biases. On a purely structural level, schools are one of the most powerful social institutions in any society, and provide a simple and direct image of what a child is to expect from that society. That is, traditionally, men direct and regulate, and women teach (Streitmatter, 1994). The students who are bound for higher education today could benefit from an academic structure that learns to limit gender bias in the classroom and its own infrastructure. Recent research is beginning to show very little, if

any difference between genders in the realm of academics on a strict performance level, but the inherent differences that students bring into the classroom are still in place, and are affected by the classroom environment which some say is subject to gender bias, and has a detrimental effect on students (Hyde & Lynn, 1986). The interaction that the instructor facilitates in the classroom towards the student is largely a product of who dominates the classroom; who interacts more often with the teacher; who generates more learning opportunities, and who is disciplined more frequently. As we will see, these behaviors can be reinforced by early gender specific behavior patterns nurtured in the infant according to what the parents, and society believe is gender appropriate. Once the child grows to interact in the adult society, the issue becomes one of a personality filter, and of young men and women who have traditionally been raised from infants to be comfortable in certain gender specific environments (Streitmatter, 1994).

If, as a society, we are beginning to accept the idea that gender differentiated behavior is a product of environmental influence, one must truly come to the conclusion that men and women are equal and capable of the same social behaviors regardless of gender. We can learn, and thrive in the same environments so long as those environments are not competing with years of socialization, or go against our perceptions of gender roles. Modern research does show how these roles are changing, but in the most extreme situations, situations that have been male dominated for many years, there still exist those environments that are fused with gender bias. It is in these situations that perhaps stronger measures need to be taken in order to begin the progression towards true gender equity. Therefore, if we accept gender-differentiated behaviors to be a product of

experience, and environment, what are some of these experiences, and to what degree do they shape the young mind?

Early Childhood Experiences and Gender Differences

Streitmatter (1994) tells us that the gender role expectations within which the adults in our society operate are not present at birth. Boys and girls are not born with an inherent understanding that they should behave in particular ways in order to achieve acceptance within society. This is learned behavior that is initiated by the infant's parents, and role models. Past research (Maccoby & Jacklin, 1974; Rubin, Provenzano, & Luria, 1974) has shown that gender role socialization begins with the way in which parents behave with, and around their newborn children. Once the gender of a newborn is known, parents have already established the gender role behaviors that they expect of their child, and act to reinforce them. That is, they dress boys in male style clothing (i.e. blue), and girls in female style clothing (i.e. pink). Parents also tend to interact differently with children according to gender. They tend to touch and hold male babies more often than female babies, and talk more to female babies than male babies (Maccoby & Jacklin, 1974). Some argue that young children induce certain gender-differentiated behaviors from their parents by the way they act. Richmond-Abbot (1983) believes that male and female babies do act differently, and thus stimulate their parents to react accordingly. This would assume the existence of biological differences, which at present, are insufficiently supported, and have not been thoroughly investigated in regards to the role of parental expectation based on the child's gender. However, the way in which an adult acts towards an infant seems to be largely controlled by that adult's pre-

judgment made on the infant's apparent gender. Some research has been done on subject reaction to the way an infant is dressed, regardless of their true gender (Rubin, Provenzano, & Luria, 1974). Adults and even children reacted to infants based on stereotypes. That is, those infants who appeared to be male were treated like males, and those who appeared to be females, were treated like females, regardless of the infants true gender. The perceived male infants were played with in a more roughhouse manner while the perceived female infants were played with in a gentler way. Tone of voice was also modulated according to gender expectation. Boys were spoken to in a louder tone of voice, while girls were spoken to in a softer tone.

Once children reach school age, around four years old, their gender identities are fairly well solidified (Streitmatter, 1994), and these roles are reinforced further by preschool teacher interaction. Research done on preschool children (Serbin, O'Leary, Kent & Tonic, 1973; Fagot, 1978) indicated that teachers interact with students in a gender-differentiated manner. It seems that boys and girls, in the classroom, are treated in much the same way as they are by their parents concerning differences in tone of voice, and disciplinary actions. For example, boys, who when young tend to behave in more of a disruptive manner than girls, are disciplined more often. Also, teachers seem to suggest gender appropriate toys and activities for children to play with. Streitmatter (1994) says that there is nothing wrong with the types of toys that children are directed to play with however, they should not be limited to only gender specific choices, or reinforced to play with one and not the other.

Television is another source of early gender differentiation reinforcement. In 1983, one study assessed that children spent an average of 25 hours per week watching

television, and by the time they were 15 years old, they had seen 15 thousand hours, compared to 11 thousand hours spent in the classroom (Richmond-Abbot, 1983). One can only assume that the amount of television children watch today is quite a bit higher. Although the modern program line-up, and content has changed significantly from what children growing up in the '70's watched, the parents of today have based their conception of male and female gender roles on the programs they watched as children, and use those conceptions to reinforce the gender appropriate behavior of their children (Streitmatter, 1994). Another early study, done in 1974, examined the portrayal of stereotypical images of men and women in television. The researchers noted that the prime-time programs had many male principle characters engaged in violence as a way of life. Conversely, women were cast in subservient roles, or as sex objects and were often the victims of violent crimes (Women on Words & Images, 1975). One need only make the connection to the gender roles perceived on television, and how they translate into viewer behavior. Research has been done by Ruble, Balaban and Cooper (1981) to examine this interaction. They reported that children who were four to five years old preferred not to play with a toy they saw advertised on television being played with a child of the opposite gender. Frueh and McGee (1975) discovered a positive relationship between the amount of television viewed by children and the degree of stereotypic belief in gender roles. In addition, as the viewer got older the more severe their stereotype would become if they were heavy viewers.

All these factors contribute to the environmental pressures that young children undergo when learning to adapt to a society in which they will be expected to perform. Therefore, one can expect a large portion of young children to embrace at least some of

the gender stereotypical behaviors that are expected of them if only for the sheer purpose of fitting in, or reducing the stress of one factor that is part of the slew of other factors present in learning to functioning successfully in modern society. There are always exceptions, but for the most part one can expect gender stereotypes to be active in school age children. Therefore, what should one expect of the young school age child who may behave in a gender stereotypical manner.

Gender Expectations in Learning

Sadker and Sadker (1991) give us an impression of the stereotypical male and female student. The male student is smart, overactive, creative, and tends to excel in math and science. He has a passion for team sports and he is a leader. Emotionally, he displays toughness, competitiveness, independence, assertiveness and or aggressiveness. He usually does not display the emotions of fear or sadness. All of these characteristics will make the boy into a successful man according to the standards set down by society. He will be judged by society on how well he can perform his role as a male, and his ability to achieve through money making, and status in the workplace. From childhood, there are two primary means through which men strengthen these attributes that will help them succeed. They are pressure to succeed in the classroom, and team sports (Sadker & Sadker, 1991).

Female students on the other hand stereotypically appear to be almost the polar opposite of males. They are obedient, and tend to stay on-task more often than boys do. Academic areas in which girls excel tend to be language arts, social sciences, and home arts. When young, children do not seem to differentiate certain classroom subjects as

gender specific. However, later in their academic lives, girls tend to think of certain subjects (i.e. mathematics) as male oriented (Fennema, Hyde, Ryan, Frost, et al., 1990). Also, female students tend to take fewer risks than males, and are less likely to be viewed as leaders. The reason given is that the assumption of a leadership role may require the female student to display assertiveness and aggression, which are behaviors that conflict with those socially acceptable as feminine. Carelli (1988) tells us that the desire to be viewed as feminine stems largely from the desire to “fit in”, or be socially acceptable, when female students reach high school. Although the possibility exists for the female student to go against the traditional roles set upon them, sometimes this route can be seen as containing too many risks, and not enough rewards (Streitmatter, 1994). However, more recently the behaviors of the “independent” woman, who possesses an equal amount of male and female stereotyped behaviors or personality traits, are becoming ever increasingly socially acceptable. Most notably when the woman reaches adulthood. At this stage, it seems that the risks of becoming a social outcast by being labeled an assertive woman are far outweighed by the benefits of securing a “high paying” job that the display of previously considered male personality traits would often procure (Bem, 1975).

Bem (1975) already indicated that women were tending to behave in a more stereotypically male fashion in order to compete in a society that favors those behaviors that were previously considered to be exclusively male. So although there seems to be differences in the socially accepted stereotypical behaviors of school aged boys and girls, these stereotypes undergo some form of revision as the girl becomes more and more a woman. However, there are those who have shown that even though some perceptions

are changing concerning socially acceptable gender-specific behavior, the classroom is still subject to a large amount of gender bias (Kramarae & Treichler, 1990; Sandler, Silverberg, & Hall, 1996).

Classroom Experiences, Gender & Collaborative Learning

There is a considerable amount of literature out there that defines and differentiates the experiences of men and women in the formal classroom setting. Before we resign ourselves to discussing only the student's experience, we must remember that there are two groups involved in establishing the classroom environment. Teachers as well as students have perceptions of how they themselves should act in the classroom. In addition, they may hold preconceived views of how students should re-act to them. From the student's perspective, Kramarae and Treichler (1990) tell us that, women seem to be more concerned than men with the teaching/learning process and attend more to the personal experiences of other students. They rate their comfort within a classroom by the openness and supportiveness of the instructor, which in turn generates their willingness to talk in class. In addition, they give more importance than do men to the teacher's attempts to ensure that class members feel good about each other. Women are likely to report enjoyment of classes in which student and teacher talk in a collaborative manner, rather than student to teacher and teacher to student monologues.

Conversely, men report more concern than do women with their own active participation in class and more interest in teacher control via the classroom discussion. They express more interest in teachers who organize most of the class content through lectures and who encourage questions and comments from individual students. Men are

more likely than women to attribute the amount of their in-class participation to personal interests and knowledge rather than to the behaviors of the teacher. Kramarae and Treichler (1990) also point out how men and women often voice their preferences clearly for those types indicated. In one instance, students participating in a collaborative, and participatory classroom environment voiced their opinions about the professor's teaching style. One woman felt that the experience was wonderful, and enjoyed the co-existing dialogues, and mutual interruption. However, a male student felt that the class lacked organization, and failed to produce a "what's right and wrong" mind set. He eventually dropped the course.

Before we discuss the classroom behavior of teachers we must first understand the scope of the educational environment, as it existed prior to movements of equality. For the majority of educational history of this country, men were the sole populace of university classrooms. Because of this, it has been argued that much of educational theory revolves around the tendency for teachers to reinforce, albeit subconsciously, behaviors exhibited by students that are socially characterized as male (Kramarae & Treichler, 1990). Sandler et al. (1996) tell us that despite our conscious beliefs that men and women are "equal", we may value men who are strong and assertive, but be uncomfortable with women who have these characteristics because we expect them to be more passive and submissive. Our gender expectations are often subtle, but cover a wide range of behavior. We expect women to be reserved about their achievements, but men to boast. In conversation, we expect men to be logical, and to explain, elucidate, and control the topic of conversational flow. In contrast, we expect women to reinforce and maintain the conversation, and to reduce any tensions while at the same time restoring

unity, if diversion exists. If these expectations are true for the majority we cannot exclude the possibility that many teachers possess them.

If teachers possess these behavior expectations in general, they may be responsible for generating classrooms that produce environments reinforcing women who might feel as though they are “unworthy” to be in there or not as worthy as their male counter parts (Sandler, et al., 1996). Sandler et al., (1996) tells us that a woman’s posture; expression, behavior and tone of voice all belie the personal assumption that she is inferior in the classroom. When men speak in the classroom, they speak slowly. This is seen as a reflection of the personal assumption that people will listen. Women on the other hand tend to read and speak faster than men and this is seen as a reflection of their internal perceptions of the unimportance of their words within the classroom. Sandler et al. (1996) tell us that the reason for this type of behavior is due to the socialization that many women are put through where they have learned to be silent in mixed social groups. However, some female students may also be non-verbally communicating their rejection of the instructor, and the classroom structure. It may also be that some students are just uncomfortable with participating, regardless of gender, and no matter what the structure of the classroom is. For example, some cultures have values that conflict with what western culture deems socially acceptable, and sometimes good students don’t participate, they listen attentively which is just as important as participating (Sandler, et al., 1996).

Ultimately, acceptable student behavior in the classroom can be seen as a microcosm of the culture that generated it (the behavior, and the classroom environment). The behaviors that Americans have become comfortable with may indeed be sexually

biased. Sometimes these behaviors are overt, and sometimes subtle, and we may have become so accustomed to them that when they are not permitted, we become uncomfortable (Sandler et al., 1996). Overt behaviors are just that and their obviousness seems to be their weakness as far as influencing the classroom environment and for the most part many people refrain from acting in an overt manner. More powerful are the subtle behaviors that have been described by Sandler et al. (1996) that occur more frequently than we might expect, and may often be overlooked. There are a series of subtle classroom behaviors that teachers may exhibit that would communicate lower expectations for female students. Examples of these behaviors include; asking female students easier, factual questions, while asking male students harder, and open ended questions that require critical thinking; grouping women in ways that imply a lower status or lower capability; making helpful comments that imply that women are less competent; doubting women's work and accomplishments; communicating lower expectation of women in the future; calling males "men", and females "gals" or "girls". All of these subtle behaviors communicate a mental separation between the perceived abilities of men and women and when coming from a professor, or someone whose opinion is valued by students, it can have powerful effects (Sandler et al., 1996). There are many other subtle behaviors that occur, but the crux of the matter is that as soon as a behavior is initiated that would normally not be initiated simply because of the presence of a woman, be it hostile or helpful, can be seen as detrimental to the building of a comfortable classroom environment.

No human being has the mental fortitude to monitor all of his or her own subconscious actions and interact successfully in a highly social environment. How then

can we create a classroom environment that will limit the ability for subtle, and sometimes unconscious discriminatory behavior? There are alternatives to spending hours of your time on personal behavior modification techniques. Most researchers of modern learning theory believe that if you change the environment of the classroom from one of sheer individual competitiveness to one in which mutual interaction is necessary, you may not only limit the possibility for the occurrence of subtle socially biased interactions, but also strengthen the ability for students to learn and approach problems from a more constructive framework (Bruffee, 1999). The explanation is inherent in the focus of authority. In a formal college classroom, the authority of the professor is not as clearly defined as it is when a child is going through middle school or high school. That is, middle school, and high school students tend to take for granted the authority of the teacher. Although sometimes students act in ways to resist that authority, these behaviors merely reinforce the student's admission to the existence of the authority (Bruffee, 1999). As students progress into the college environment, the authority of the teacher/professor encompasses the responsibility to foster a sense of doubt towards anything that is "professed". Therefore we see a sense of conflict in the role of the professor. On one hand the professor must profess, and achieve the trust of the student, and on the other he or she must somehow encourage resistance to that trust. This is a balance that is difficult to achieve, and often leaves the professor establishing the trust of the students on principles that rely heavily on the skills of leadership. Leadership established through pure knowledge expertise, or personality. This in a sense opens the door wide for the professor to inadvertently behave in ways that appear to some as sexually discriminating, or biased (Kramarae & Treichler, 1990). Therefore, in some classrooms, where

professors may be unconsciously predisposed to act in a gender biased manner, the change in the interaction of the professor toward the students from authoritarian expert, to collaborative facilitator may help to limit the occurrence of some of these subtle, socially biased, behaviors (Sandler et al., 1996).

In addition to limiting inadvertent gender biased behavior, the collaborative learning process may also help to bring about a desire to participate in those students who may be intimidated by a competitive classroom. Sandler et al., (1996) appear to believe that the classroom should be treated more like a therapeutic session for students to overcome insecurity, or build skills that might help them in the real world. The classroom structured around collaborative learning would help to build a sense of inclusion for those students who are reluctant to participate when the same classroom is structured in a competitive manner. Some may disagree with this philosophy. There are those professors who believe that the competitive structure of the classroom is a precursor to what the real world will bring to the student once they graduate. One professor at the author's graduate institution tells all his students, "I am preparing you for what difficulties you might face in the workplace, and better to stumble, and a mess up here than to perform poorly in front of your boss." This very statement is grounded in the social structure of the entire culture. We may start to teach students in a collaborative manner, but will the attention given to foster a sense of teacher student collaboration and unity really prepare the student for what occurs in the real world? This question deserves further exploration.

Origins of Collaborative Learning

The traditional method of university teaching, that of lecture, presumes that an expert will present to the students an objective, rationally derived and empirically proven set of information. This method, no matter how complete, can only reflect one version of reality, which is usually the dominant version in that culture (Brufee, 1999).

Collaborative learning envisions a relationship in which students become self-directed learners, and is based in part on the progressive educational theory of John Dewey (1938), and the theories of collaborative learning and liberatory teaching espoused by Paulo Freire (1972).

Dewey's (1938) theory revolved around an idea mentioned earlier. Student's perceptions about the structure of society involve largely the structure they perceive in the classroom and the school environment. This being the case, teachers should construct a classroom environment around the principles that they wish to instill in the children of that society. Dewey believed that if you foster a sense of cooperation, and collaboration in children through the classroom, these ideas and principles will carry over into society at large (Streitmatter, 1994). Freire (1972) also believed that the principle of collaboration should be implemented into the classroom, however his ideas revolved around the re-acculturation of students. By teaching the illiterate poor in Brazil, in *Pedagogy of the Oppressed*, he discovered that his students were having difficulty not because they were unintelligent, but because they in effect were being exposed to an entirely different culture than the one in which they had spent their entire lives. Such can be said of the freshmen who arrive on the campuses of colleges and universities every fall. In essence these freshmen are coming out of a culture they have grown accustomed

to and are forced to re-acculturate themselves into the college environment. Most students do not have a difficulty with this, however, when social stress is added to the pressures of a new environment, the interaction is sure to affect the student in some form or another (Brufee, 1999). It is believed that the application of a collaborative environment to university classrooms will in effect broaden the cultural perspectives of students both male and female, while enriching their learning experience and bolstering the skills needed in order to become successful not only in the university, but also in life (Brufee, 1999).

Collaborative Learning: Classroom Applications

Collaborative learning, in its' simplest form, is the instructional use of small groups in a learning environment, so students can work together to maximize their own learning, and the learning of each other. Teaching a class in a collaborative style involves more than just situating students in groups, it requires that the students involved participate in a series of highly structured activities with all of the group members understanding, and embracing important principles. Some of which are; possessing interdependence, promotion of each others learning, holding each other accountable for equal work done, and the use of interpersonal skills insuring the success of cooperative efforts (Johnson, Johnson & Karl, 1991).

The benefits of teaching in a collaborative manner include the strengthening of specific-content, and problem solving skills, while fostering improved cognitive processing, and providing long-term support for academic progress. At the same time, as long as all students adhere to the fundamental principles needed to ensure successful

collaborative learning, no one student will be singled out to do all the work (Sandler et al., 1996). In over 375 studies done to compare cooperative (collaborative) learning against competitive (individualistic) learning, cooperative learning was found to promote higher achievement (Johnson et al., 1991). At present, the large majority of collaborative learning studies were not conducted as being gender specific, but research done of female pedagogy supports the belief that women will perform better in less competitive, and more collaborative learning environments (Belenky, Clinchy, Goldber & Tarule, 1986).

Collaborative classrooms are run in a way that is counter to what most of us have experienced in our education, and even in how many people have been professionally trained. Most of us have experienced a competitive educational environment in which students are individually evaluated for their performance. Sandler et al. (1996) makes the argument that this type of individualistic attitude towards the work done by students belies the assumption that authorship is individual, where in reality, people tend to consult many other people when working in the real world. Therefore we see an educational system that trains people to be independent, where once they are in the workforce they actually need to work in a collaborative manner. The pedagogical strategy of the collaborative model requires that students be involved in constructing the knowledge they receive and gives just as much value to the learning process as the knowledge itself. If collaborative learning is combined with a lecture type classroom environment, greater retention of the information will ensue (Johnson et al., 1991).

Johnson et al. (1991) tells us that in order for a collaborative task to be successful, it must include 5 essential elements.

-Interdependence; the goal identified by the instructor must in some way or

another ensure that collaboration is required to be achieved.

-Interaction; students must be encouraged to assist each other.

-Individual accountability; the instructor must ensure that all members of the group are equally accountable for the work done. This may be accomplished by letting the group know that anyone may be called upon to present the group material.

-Development of social skills; social skill development must be stressed, and the importance of such indicated by the instructor.

-The ability for the group to evaluate their progress and relationships; instructors must be sure to implement a plan by which the students can evaluate themselves, each other, and the group on performance. The goal of which is to ensure true interdependence of the group members, assuring a shared level of mastery over the material.

If the collaborative environment is designed well, an increase in student achievement is to be the result.

Achievement and Collaborative Learning Theory

Past researchers have shown the positive effects of collaborative learning on student achievement (Slavin, et al., 1985; Slavin, 1995; Hayes, 1976; Litow & Pumroy, 1975). Slavin (1995) identifies four theoretical perspectives that explain these effects; **Motivational, Social Cohesion, Cognitive, and Developmental**. From a motivational perspective, collaborative learning focuses on the reward or goal structures under which students function (Slavin, 1995). By putting the focus on the achievement of the group as

a whole, instructors take the focus away from the achievement of the individual, and reinforce behaviors within the group to help each other achieve. Slavin (1995) believes this could be done by giving rewards for the average scores of a particular group in certain situations. However, use of group rewards for collaborative learning is effective if and only if the group rewards are based on the individual learning of all group members (Slavin, 1995). This must be accomplished by not allowing the group to present one finished product, which may result in one or two group members doing all of the work (Slavin, 1995). The social cohesion perspective relies on the cohesiveness of the group being reinforced through task specialization among the group members (Cohen, 1994a). That is if each member of the group is assigned a different responsibility, then they will form a bond that will increase their desire to achieve (Slavin, 1996). From a cognitive perspective, collaborative learning is successful because of the way in which student's process information mentally when in a group. Cognitive theory on collaboration is closely related to the developmental perspective, which describes the success of collaborative learning as a product of an increase in a student's ability to master critical concepts. It is the interaction of students through discussion and argumentation that promotes this mastery (Slavin, 1996). Although there is some debate over which of these four perspectives is prominent in explaining the success of collaborative learning, Slavin (1996) believes that they act to compliment one another.

The Current Study

At present, aviation education falls into the classification of a male dominated field. This can easily be demonstrated by observing the number of male compared to

female students enrolled in aviation education programs. For example, the female population of Embry Riddle Aeronautical University, in Daytona Beach Florida, is 16%. In addition, those subjects that are core to an aviation education such as mathematics, and physics are thought of as generally being male gender specific (Sandler, et al., 1996). As with any university program, as long as the classroom environment revolves around the premise that the student is individually responsible for, and ranked according to, his or her classroom performance, and knowledge retention is measured by tests and home works completed individually, that environment can be considered as being competitive (Sandler, et al., 1996). Competitive environments have been shown to affect certain students negatively, by influencing performance, and achievement (Sandler, et al., 1996).

These competitive environments tend to contain a social microcosm in which teacher and student interaction is based on the recognition of individual expertise, and classroom dominating behaviors. It has been shown that these environments are compatible with socially accepted male behaviors, and not compatible with socially accepted female behaviors (Sadker, Sadker & Klein 1991; Sandler, et al., 1996). As a result, incidents of bias tend to occur simply as a “weeding out” type of behavior in which those students not exhibiting favorable, or classically male type behavior end up being the targets (Sandler, et al., 1996; Streitmatter, 1994). One need only make the connection that women usually end up being these targets. Researchers have shown that women tend to favor an educational environment that is collaborative in method (Civikly, 1992; Cooper & McIntyre, 1993; White et al., 1992; Lewis et al., 1968; Sandler & Hall, 1986; Spitzack & Carter, 1987; Treichler & Kramarae, 1983; Wood, 1992, 1993; Wood & Lenze, 1991; Belenky et al., 1986; Sandler, et al., 1996; Streitmatter, 1994). However,

will this favor extend to females across all student levels that are enrolled in a male dominated university? It was the original intention of the researcher to test the theory of female preference for collaborative classroom teaching methods by way of conducting actual classroom exercises in a collaborative teaching method and record and compare student's opinions for these classes against traditional competitive classes. However, due to a lack of resources this was not possible. The method used for this study involved the measuring of student agreement with three fictional syllabi designed to describe, as accurately as possible, teaching methods that would create a collaborative and two competitive classroom environments. Ultimately, it was the intention of this study to analyze student preferences for proposed classroom instruction methods, and determine if accepted theories of female collaborative learning preference will hold true in a severely male dominated university, and classroom setting and if these preferences change as the student gains experience.

Statement of Hypothesis

If the theories of female preference for collaborative classroom teaching environments are correct then the females surveyed in this study should prefer collaborative learning environments over competitive and individual ones. However, whether or not student experience affects this preference remains to be seen. It is quite possible that students with more college credits have different preferences for learning environments than less-experienced students. Thus, credit hours will be controlled for in data analysis in order to focus specifically on the effects of gender and learning environment as they relate to instructor philosophy and prediction of performance. It is

expected that females will rate the question of agreement with instructor's philosophy and prediction of performance significantly higher than males will for the collaborative syllabus, and males will rate either the competitive or independent syllabi higher than females for the same two survey items. No expectations are put forth for the effects of experience on these preferences.

Method

The study conducted measured student preference for three differing classroom environments by way of recording, and analyzing students' responses to three fictional class syllabi. Syllabi were created for the individual teaching method, the competitive teaching method, and the collaborative teaching method and administered one to a student. Individual, and competitive teaching methods are hybrids of the competitive method defined by Sandler, et al., (1996) in which each student is responsible for their own classroom performance. The individual syllabi described a classroom teaching method in which the emphasis is on the student's performance individually. The grade students earn is the grade they earn, so to speak, and other students in the class bear no role in the determination of that grade. The competitive teaching method put students in direct competition for grades with other students in the class by allowing only a fixed number of letter grades available to the entire class. Those students that perform the best will get A's, once all the A's are gone those students ranked next according to performance will receive the next available letter grade until all grades have been assigned. The proportion of grades will follow a bell-curve ranging from F to A, with C's being the most numerous. Finally, the collaborative method described a classroom

environment in which the students work through the entire class within a small group. The individual grade of each student would be used to generate an average for the group, which in turn would become the final grade for each student in that group (Strietmatter, 1994; Sandler, et al., 1996). In addition to differing in grading method, each syllabus contained a paragraph about the teaching philosophy of the instructor, that emphasized why the professor felt that the method in which he or she taught class (individual, competitive, or collaborative) was a direct reflection of what that student would expect in their careers. Preference for these syllabi were recorded via a two of the 13 survey items administered to participants after they read their assigned syllabus. Questions 1 (agreement with instructor's philosophy) and question 8 (prediction of performance) were used as the measure of student preference. After the survey was completed demographic information was collected for each participant including credit hours which served as the indicator of experience for each participant.

Participants

The researcher visited 12 different classrooms in November of 2002 at Embry Riddle Aeronautical University and randomly presented one of three fictional class syllabi to each student in those classes, as well as having students complete a measure of sex-role orientation. Administration of the syllabi was controlled for equal distribution of the three different syllabi. A total of 264 students took the survey ranging in age from 18 to 42. Out of these 264, 39 were female and 225 were male. Females had an average of 45.8 credit hours and males had an average of 41.9 credit hours. This data was analyzed

in order to determine if differences existed between preference for three different syllabi types and sex, co-varied with credit hours.

Materials and Procedures

The three fictional class syllabi were all modifications of an actual class syllabus used at Embry-Riddle Aeronautical University for the AS-130 class. No material descriptions for the class were altered, only two discreet sections concerning the professor's philosophy, and grading format for the class. All three syllabi can be found in Appendix A. Once distributed, the participant was directed to read over the syllabus and pay close attention to specific areas that were marked with an asterisk. Once that task was completed, participants were directed to fill out a 13-item survey measuring attitudes about the syllabus they reviewed by way of varying levels of agreement and disagreement on survey items that used a Likert scale ranging from 1 to 6, with 1 indicating a response of "strongly disagree", and 6 indicating a response of "strongly agree". The actual survey used is provided in Appendix B. Each survey was identical, and all questions were designed as statements that the participant was asked to agree or disagree with. Eleven of the questions were not used in the analysis but were kept in a database to be used at a later date. The questions used for the analysis were designed to measure student preference for the class described in the syllabus. In addition to the Likert items, demographic information was collected concerning participant's age, gender, major, credit hours completed, and pilot status. A brief statement asking about gender bias experiences was included at the end of the survey and was intended to be used only as anecdotal information, or for a later research project.

Power Analysis

There were no studies found that measured the same variables that the proposed study measured. Therefore, an inference had to be made, and a study of somewhat similar format was used upon which to base a power analysis. The Hardigan and Sisco (2001) study analyzed learning styles among 814 undergraduate students by means of an LSP, or Learning Style Profile. This study was used, as a reference point upon which a power analysis was performed with the intention of determining how many subjects will be needed for the proposed study. The results of one of the factors measured by Hardigan and Sisco (2001), was used to compute ϕ , and the obtained value was referenced on an analysis of variance power function chart. Results indicated that 240 subjects would be needed in order to achieve the desired power value of .80.

Analytical Model

A 2 x 3 between subjects ANCOVA was performed with 1 co-variate for each of the two dependant variables, philosophy agreement and performance prediction. Each analyses was preformed with the independent variables of sex (male and female) and syllabi type (collaborative, competitive, and independent). The co-variate used across analyses was credit-hours as a measure of experience for each participant.

Results

The purpose of this experiment was to determine if sex (male and female) and syllabus type (collaborative, competitive and independent) influenced two ratings of classroom preference measured by agreement with instructor philosophy and prediction of classroom performance. The experiment also controlled for student experience, measured by credit hours. *Table 1* summarizes agreement with professor's philosophy (labeled as Philosophy) data for each syllabi type, separated by sex.

Table 1

Group Means and Standard Deviations for the Philosophy Dependent Variable

Syllabi Type	Collaborative			Competitive			Independent		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Male	4.06	1.30	81	2.91	1.53	72	4.36	1.33	72
Female	4.07	.95	13	3.80	1.52	15	4.90	.70	11
Total	4.06	1.25	94	3.06	1.56	87	4.43	1.28	83

Table 2 summarizes agreement with the personal performance prediction (labeled as Performance) data for each syllabi type, separated by sex.

Table 2

Group Means and Standard Deviations for the Prediction Variable

Syllabi Type	Collaborative			Competitive			Independent		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Male	4.34	1.09	81	4.11	1.18	72	4.59	1.13	72
Female	4.23	.72	13	3.93	1.27	15	4.27	1.10	11
Total	4.32	1.05	94	4.08	1.19	87	4.55	1.12	83

The data were analyzed using two between subjects factorial ANCOVAs, one for each dependent variable, with one co-variate used across both models. An alpha level of .05 was used for all significance testing. The results of the ANCOVA for the Philosophy variable indicated credit hours as a significant covariate $F(1, 257) = 23.23, p < .001$, sex $F(1, 257) = 5.21, p = .023$, and syllabus $F(2, 257) = 9.99, p < .001$. The interaction term failed to be statistically significant, $F(2, 257) = 1.24, p = .290$. Table 3 presents additional information regarding the ANCOVA results, including effect size and power.

Table 3

ANCOVA Source Table for Philosophy

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>Partial ETA</i> ²	<i>Power</i>
Credit Hour	1	39.706	39.706	23.228	.000	.083	.998
Sex	1	8.908	8.908	5.211	.023	.020	.623
Syllabus	2	34.180	17.090	9.997	.000	.072	.984
Sex * Syllabus	2	4.250	2.125	1.243	.290	.010	.269
Error	257	439.328	1.709				
Total	264	4495.000					

The results for the ANCOVA for the Prediction variable indicated credit hours as a non-significant covariate $F(1, 257) = .015, p = .901$, and non-significant main effects for both sex $F(1, 257) = 1.09, p = .297$, and syllabus $F(2, 257) = 1.53, p = .218$. In addition the interaction term failed to be statistically significant $F(2, 257) = 0.08, p = .916$. *Table 4* presents additional information regarding the ANCOVA results, including effect size and power.

Table 4

ANCOVA Source Table for Prediction

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>	<i>Partial ETA</i> ²	<i>Power</i>
Credit Hour	1	.020	.020	.015	.901	.000	.052
Sex	1	1.397	1.397	1.094	.297	.004	.181
Syllabus	2	3.910	1.955	1.531	.218	.012	.324
Sex * Syllabus	2	.224	.112	.088	.916	.001	.063
Error	257	328.155	1.277				
Total	264	5262.000					

A Tukey HSD post hoc was performed to test the adjusted means for both main effects.

Finding the harmonic mean for each group in the comparisons controlled for the unequal sample sizes. *Table 5* and *Table 6* present the results of the comparisons.

Table 5

Group Mean Differences Between Sexes for the Philosophy Variable

	Female	Male
Female	----	3.23*
Male		----

* significant at the .05 level

** significant at the .01 level

Table 6

Group Mean Differences Between Syllabus Types for the Philosophy Variable

	Female	Male
Collaborative	4.91**	3.91*
Competitive	----	8.66**
Independent	----	----

* significant at the .05 level

** significant at the .01 level

Discussion

The purpose of this study was to evaluate differences in attitudes about classroom environment, as they related to preferences for three different classroom syllabi and sex of participant, while controlling for credit hours. Current theory dictates that females will prefer collaborative classroom teaching environments over competitive ones, and males will prefer competitive classroom teaching environments over collaborative ones. The importance of this difference lies in the support of the establishment of classroom teaching methods that will be more sympathetic to the needs of women, especially when subtle gender bias is prone to be a factor.

If we apply current theory to this study, women should rate collaborative classroom environments higher than competitive, and higher than males rate collaborative. In addition, males should have rated competitive higher than collaborative and competitive higher than females. A purely descriptive comparison of means obtained for each syllabi type indicate that, for the philosophy variable, females did rate collaborative ($M = 4.07$) higher than competitive ($M = 3.80$), but relatively the same as

males rated collaborative ($M = 4.06$). Males, for the philosophy variable, did not rate competitive ($M = 2.91$) higher than collaborative ($M = 4.06$). In addition, males tended to rate competitive ($M = 2.91$) lower than females ($M = 3.80$). It does not come as a surprise that the syllabus with the most extreme grading scheme and philosophy scored the lowest with the participants, however, the competitive syllabus was designed to be excessive. What is of interest is that the independent syllabus scored the highest across both sexes ($M = 4.90$ female, $M = 4.36$ male). Independent scored higher than collaborative for females and was the highest scoring syllabi of the three. The independent syllabus was patterned after how most university classrooms are already conducted. Each student is responsible for their own work, and their performance is evaluated in lieu of other students. This is the classroom experience that most students have grown up with from their first experiences in grade school or even earlier. John Dewey tells us that the classroom is a microcosm of the society that spawned it. Therefore, if an independent classroom environment is what students experience most while advancing through the education system, we cannot expect them to be as receptive to other classroom teaching and learning environments that stray from this norm. In fact, students may carry with them internal expectations for all classrooms to be run in the way that the individual syllabus indicates. What does this mean for women in a male dominated environment?

A number of factors concerning this analysis must be considered before we resign to the conclusion that female preference of collaborative classroom environments is false. Obviously one study is not enough to disprove a theory. We must understand the limitations of the present study. The first possibility might be that the manipulation

was rather weak, in regards to representing collaborative learning in an applied sense. Reading about something, and experiencing something are two unequal things. To get a true measure of preference for classroom environments, one must physically create the environments and have students experience them first hand by participating in them. Another obvious limitation would be the low number of women sampled compared to males. Thirty nine women were sampled but numbers far below what were needed for normalcy of the sample distribution were obtained for each syllabi type. Without at least 30 women for each manipulation, we cannot wholly rely on our obtained responses to be representative of the population of Embry Riddle women.

With that said, the results of this test may actually indicate that females at Embry Riddle do not behave in a stereotypical fashion. Men and women appeared to have the same preferences for classroom environment, albeit women had a tendency to indicate significantly higher scores. Interestingly enough, the classroom environment that had the least group mean difference between the sexes was collaborative. Women did not respond higher than men, alluding to the possibility that the manipulation was weak.

The results of this analysis require further investigation. We cannot assume that women at Embry Riddle differ from the population of women sampled in other collaborative learning experiments without a separate analysis. However, we are given a glimpse of how students perceive classes through communication via a syllabus. The next step would be to determine how well they would actually perform in these classes. That was the goal of the Prediction variable, which was a wholly inadequate manipulation for that purpose.

Further research should take the form of analyzing the gender-role scores obtained from the PAQ included with the survey. These scores will give us an indication of the gender-role behavior tendencies of the participants, and perhaps lend insight into why student ratings did not occur as expected. Additional research should also seek to build upon the female participant sample which needs strengthening before additional analyses are completed. If a more normal distribution is obtained for females across syllabi manipulations, more confidence can be given to the results. Finally, 21 different measurements were obtained in this survey for 264 participants, all students at Embry Riddle Aeronautical University. There are multiple ways in which this data could be further analyzed either to clarify the results of this study, or generate a new hypothesis.

In conclusion, this study cannot be labeled as successful or unsuccessful. A significant effect was observed, in that way it can be said to be successful, however, in support of changing the environment of Embry Riddle classrooms into a more collaborative learning experience, this study was unsuccessful. Women did indicate preference for collaborative over competitive classrooms, but they also indicated preference for independent over collaborative. This tells us that if the independent syllabus truly contains a description that is representative of the way most classroom environments are run already, then it appears that women, from a purely theoretical standpoint, would rather participate in them than collaborative classrooms. Which would then lead us to examine the possibility that changing the classroom environment would not be the route to take in order to decrease or eliminate bias experienced in the classroom. This notion should be examined further.

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Appendix A

The three, fictional, classroom syllabi

Below is the collaborative teaching method syllabus

Embry-Riddle Aeronautical University Department of Aeronautical Science

**AS-130 Aeronautics I
Fall 2002 Semester
Credit Hours: 4**

Instructor: C Smith **Office:** Rm 123 **Office Hours:** See Posted Schedule
Phone: 904-576-4213 **Email:** smithc@cts.db.erau.edu
Prerequisite: None

Note: Areas of this syllabus marked with an “*” indicate areas of particular importance for the student

*** Teacher’s Philosophy:** Modern aircraft are highly complex, and demanding machines. They require the utmost attention, and skill to operate successfully. As a captain, you will be working closely with your crew to manage all aspects of the flight systems. Responsibility is a shared aspect of the flight crew, and you must be able to draw from the skills of various personalities in your group. Therefore, the environment of this classroom will be designed around collaboration in order to foster these skills. Students will work together in small groups for all assignments including exams. Each student will receive an individual grade, however that grade will be averaged together with those in your group to obtain a final grade. This group grade will be your recorded grade. Teamwork is an important skill to have, and the way you apply yourself within a group will determine your success in life, and your chosen profession.

Course Goals: To build upon the students basic knowledge of aviation and visual air navigations by providing in-depth instruction and analysis of aviation and navigation theories, principles and procedures in a variety of higher performance aircraft. To prepare students for advancement into Aeronautics II and upper level Aeronautical Air Science Courses.

Performance Objectives: Upon completion, students will be able to

- 1) Explain the principles of flight as they apply to light, general aviation aircraft
- 2) Locate, interpret, and explain the Federal Aviation Regulations, the Aeronautical Information Manual, and other aviation publications as they apply to single-pilot, single-engine, VFR flying
- 3) Describe and explain airport operations, including marking and lighting, radio communications, and the correct application of FARs
- 4) Explain the objectives of higher education and the roles and responsibility of students and professors
- 5) Develop or improve and practice efficient study skills: goal setting, textbook study, time management, listening, note taking, memory improvement, stress reduction, and test taking
- 6) Identify and use tutorial centers as needed
- 7) Use the university advising and registration system effectively
- 8) Identify and use the campus resources which will aid in academic success particularly the Career Center, the Counseling Center, the Student Activities office, and the Health Center
- 9) Identify and effectively access community resources that are meant to enhance their college experience

*** Grading:** During the course, the student’s group should successfully complete

- 1) A minimum of four section examinations.
- 2) Six VFR flight plans and associated simulated flight problems.
- 3) A minimum of twelve in class quizzes
- 4) A final comprehensive section examination incorporating all the major subject areas in the course.
- 5) Achieve a final minimum grade of 60% or better on a composite of the four items listed above.
- 6) There will be no make up exams without an official / legitimate excuse. An unexcused absence from any exam will result in a grade of ZERO for that exam, for that student. ALL exams will count - nothing will be dropped when calculating the group average. Quizzes/homework must be turned in on time. The lowest two quiz averages for your group will be dropped.
- 7) A group who has no unexcused absences for their members will have his/her final average increased one (1) percentage point. One unexcused absence within a group will = .5% point reduction on the final average.
- 8) A group in which the total unexcused absences of the involved students is in excess of 15% of scheduled classes they will have their group grade reduced by one letter grade. If more than 25% of the scheduled classes are missed, the final course grade for the group will automatically become an "F"!
- 9) Your final grade is a compilation of your groups class participation, attendance, quiz and exam grades as follows:

Section 1	15%
Section 2	15%
Section 3	15%
Section 4	15%
Final Exam	20%
Open Book, Homework, and Quizzes	20%

- 10) Grades will be computed by averaging the grades of the group, and using the following as a guide for your group/final grade:
 - A = 100 - 90.0
 - B = 89.9 - 80.0
 - C = 79.9 - 70.0
 - D = 69.9 - 60.0
 - F = 59.9 - 0
- 11) Aircraft Dispatcher Program students must achieve a group minimum grade of 70.0 to remain active in that program.

Class Policies:

- 1) Bring to each class the Text and Equipment specified in the syllabus.
- 2) Attendance will be taken at each class session and will be considered when the final grade is complete. If you are late, you must make that fact known to me by the end of that class if you expect to get credit for attendance. If you are absent from a class, you must contact me no later than the next class that you attend if you expect to receive credit for an excused absence. Notification prior to a known absence might work in your favor.
- 3) Classroom Conduct: Be on time and be prepared for class. No food or drinks in the classroom. Hats off. Shoes on.
- 4) Feel free to ask relevant questions in class.

Below is the competitive teaching method syllabus.

**Embry-Riddle Aeronautical University
Department of Aeronautical Science**

**AS-130 Aeronautics I
Fall 2002 Semester
Credit Hours: 4**

Instructor: C Smith **Office:** Rm 123 **Office Hours:** See Posted Schedule
Phone: 904-576-4231 **Email:** smithc@cts.db.erau.edu
Prerequisite: None

Note: Areas of this syllabus marked with an "*" indicate areas of particular importance for the student

*** Teacher's Philosophy:** It is my philosophy to generate, within the classroom, an environment in which each student is responsible for the work they do, but must compete with their fellow students for the best grades. There are a finite number of A's, B's, C's, D's, and F's. The students who perform the best on test, quizzes, homeworks, and participation, will be rewarded with A's, for those items. Each other letter grade will be assigned for the next best performance, until all grades are given. The amount of each letter grade available will be in proportion to the number of students in the class. This type of system will prepare you for the competition you will face in the real world. There are only a finite number of jobs in the aviation community, and only through hard work will you, as a student, be prepared to outperform your competition. Any type of interaction with your fellow students on the assigned work, and tests will be allowed, but remember, any help you give your neighbor will put them in contention for your grade. You decide the course of your life, and such is the case with this class.

Course Goals: To build upon the students basic knowledge of aviation and visual air navigations by providing in-depth instruction and analyzes of aviation and navigation theories, principles and procedures in a variety of higher performance aircraft. To prepare students for advancement into Aeronautics II and upper level Aeronautical Air Science Courses.

Performance Objectives: Upon completion, students will be able to

- 1) Explain the principles of flight as they apply to light, general aviation aircraft
- 2) Locate, interpret, and explain the Federal Aviation Regulations, the Aeronautical Information Manual, and other aviation publications as they apply to single-pilot, single-engine, VFR flying
- 3) Describe and explain airport operations, including marking and lighting, radio communications, and the correct application of FARs
- 4) Explain the objectives of higher education and the roles and responsibility of students and professors
- 5) Develop or improve and practice efficient study skills: goal setting, textbook study, time management, listening, note taking, memory improvement, stress reduction, and test taking
- 6) Identify and use tutorial centers as needed
- 7) Use the university advising and registration system effectively
- 8) Identify and use the campus resources which will aid in academic success particularly the Career Center, the Counseling Center, the Student Activities office, and the Health Center
- 9) Identify and effectively access community resources that are meant to enhance their college experience

*** Grading:** During the course, the student should successfully complete

- 1) A minimum of four section take home examinations
- 2) Six VFR flight plans and associated simulated flight problems
- 3) A minimum of twelve in class quizzes. Most quizzes will be announced, but some short "pop"

variety quizzes will be given to test knowledge of assigned reading/problems.

- 4) A comprehensive, take home, final examination incorporating all the major subject areas in the course.
- 5) Achieve a final minimum grade of D or better on a composite of the four items listed above.
- 6) There will be no make up exams without an official / legitimate excuse. An unexcused absence from any exam will result in zero points for that exam. ALL exams will count - nothing will be dropped. Quizzes/homework must be turned in on time. For planning purposes, a missed quiz will result in approximately a 5 point reduction of your total.
- 7) A student who has no unexcused absences will have his/her final average increased one (1) percentage point. One unexcused absence = .5% point on the final average.
- 8) A student who misses an excess of 15% of scheduled classes (unexcused) be deducted 25 points. If more than 25% of the scheduled classes are missed, the student will be deducted 100 points.
- 9) Your final grade is a compilation of the points you earn for class participation, attendance, quiz and exam grades as follows:

Section 1	100 points (max)
Section 2	100 points (max)
Section 3	100 points (max)
Section 4	100 points (max)
Final Exam	150 points (max)
Class Participation	50 points (max)
Homeworks	50 points (max)
Quizzes	50 points (max)

- 10) Grades will be computed using the following as a guide:

All tests, homeworks, quizzes, and participation will be assigned a number of points upon completion. These points will be used to rank order you in the class. Those scoring the highest amount of points will receive A's, and so on until all grades are given. The number of letter grades available will be calculated by using the following formula:

10% of the class will get A's (i.e., in a class of 50, there will be 5 A's dispensed)
 20% of the class will get B's
 40% of the class will get C's
 20% of the class will get D's
 10% of the class will get F's

Therefore, a total of 700 points can be achieved, and I have seen it done before.

- 11) Aircraft Dispatcher Program students must achieve a minimum grade of C to remain active in that program.

Class Policies:

- 1) Bring to each class the Text and Equipment specified in the syllabus.
- 2) Attendance will be taken at each class session and will be considered when the final grade is complete. If you are late, you must make that fact known to me by the end of that class if you expect to get credit for attendance. If you are absent from a class, you must contact me no later than the next class that you attend if you expect to receive credit for an excused absence. Notification prior to a known absence might work in your favor.
- 3) Classroom Conduct: Be on time and be prepared for class. No food or drinks in the classroom. Hats off. Shoes on.
- 4) Feel free to ask relevant questions in class.

Below is the individual teaching method syllabus.

**Embry-Riddle Aeronautical University
Department of Aeronautical Science**

**AS-130 Aeronautics I
Fall 2002 Semester
Credit Hours: 4**

**Instructor: C Smith Office: Rm 123 Office Hours: See Posted Schedule
Phone: 904-576-4213 Email: smthc@cts.db.erau.edu
Prerequisite: None**

Note: Areas of this syllabus marked with an “*” indicate areas of particular importance for the student

*** Teacher’s Philosophy:** It is my desire to create within the classroom, an environment in which each student is individually responsible for the work that they do. You will get out of the class that which you bring into it. This type of class will prepare you for the situations you will face as a professional pilot because, when you are in the cockpit, you, and only you are responsible for all of your successes and failures. It is the role of a successful captain to take the responsibility of their actions either good or bad, and perform to their best of their individual abilities. Hopefully, this class will help foster in you an attitude that will make you successful in your chosen career, but also in life. Keeping these ideals in mind, I must make it known that I do not condone any collaboration amongst students for any of the assignments. You are only hurting your fellow classmate, and keeping them from attaining their true potential. Because once you are flying, you will often have to make decisions based solely on your individual skill. Therefore, any overlap in the work I detect, i.e. duplicate homework results etc., those students involved will receive zeros for those assignments.

Course Goals: To build upon the student's basic knowledge of aviation and visual air navigations by providing in-depth instruction and analysis of aviation and navigation theories, principles and procedures in a variety of higher performance aircraft. To prepare students for advancement into Aeronautics II and upper level Aeronautical Air Science Courses.

Performance Objectives: Upon completion, students will be able to

- 1) Explain the principles of flight as they apply to light, general aviation aircraft
- 2) Locate, interpret, and explain the Federal Aviation Regulations, the Aeronautical Information Manual, and other aviation publications as they apply to single-pilot, single-engine, VFR flying
- 3) Describe and explain airport operations, including marking and lighting, radio communications, and the correct application of FARs
- 4) Explain the objectives of higher education and the roles and responsibility of students and professors
- 5) Develop or improve and practice efficient study skills: goal setting, textbook study, time management, listening, note taking, memory improvement, stress reduction, and test taking
- 6) Identify and use tutorial centers as needed
- 7) Use the university advising and registration system effectively
- 8) Identify and use the campus resources which will aid in academic success particularly the Career Center, the Counseling Center, the Student Activities office, and the Health Center
- 9) Identify and effectively access community resources that are meant to enhance their college experience

*** Grading:** During the course, the student should successfully complete

- 1) A minimum of four section examinations
- 2) Six VFR flight plans and associated simulated flight problems

- 3) A minimum of twelve in class quizzes. Most quizzes will be announced, short "pop" variety given to test knowledge of assigned reading/problems.
- 4) A final comprehensive section examination incorporating all the major subject areas in the course.
- 5) Achieve a final minimum grade of 60% or better on a composite of the four items listed above.
- 6) There will be no make up exams without an official / legitimate excuse. An unexcused absence from any exam will result in a grade of ZERO for that exam. ALL exams will count - nothing will be dropped. Quizzes/homework must be turned in on time. The lowest two quizzes will be dropped. For planning purposes, a missed quiz will result in approximately a one point reduction of your grade.
- 7) A student who has no unexcused absences will have his/her final average increased one (1) percentage point. One unexcused absence = .5% point on the final average.
- 8) A student who misses an excess of 15% of scheduled classes (unexcused) will have his/her grade reduced by one letter grade. If more than 25% of the scheduled classes are missed, the final course grade will automatically become an "F"!
- 9) Your final grade is a compilation of class participation, attendance, quiz and exam grades as follows:

Section 1	15%
Section 2	15%
Section 3	15%
Section 4	15%
Final Exam	20%
Open Book, Homework, and Quizzes	20%

- 10) Grades will be computed using the following as a guide:
 - A = 100 - 90
 - B = 89.9 - 80.0
 - C = 79.9 - 70.0
 - D = 69.9 - 60.0
 - F = 59.9 - 0
- 11) Aircraft Dispatcher Program students must achieve a minimum grade of 70.0 to remain active in that program.

Class Policies:

- 1) Bring to each class the Text and Equipment specified in the syllabus.
- 2) Attendance will be taken at each class session and will be considered when the final grade is complete. If you are late, you must make that fact known to me by the end of that class if you expect to get credit for attendance. If you are absent from a class, you must contact me no later than the next class that you attend if you expect to receive credit for an excused absence. Notification prior to a known absence might work in your favor.
- 3) Classroom Conduct: Be on time and be prepared for class. No food or drinks in the classroom. Hats off. Shoes on.
- 4) Feel free to ask relevant questions in class.

Appendix B

Survey Questionnaire

Imagine that you have signed up to take the class presented by the syllabus you just read. Please rate the following statements based on how you might feel as a student in the class. Each scale is numbered from 1 to 6, with 1 indicating strong disagreement, 6 indicating strong agreement, and the range of numbers in between representing various intensities of disagreement, and agreement.

1. I agree with the philosophy of the instructor.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

2. The structure of the class is fair to all students. (i.e. free from injustice)

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

3. I understand the grading system of the class.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

4. The grading system is fair.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

5. Based on the way the class is being taught, there will be a lot of interaction among the students.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

6. I am comfortable with the level of interaction that will occur in this class.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

7. I have taken classes like this before.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

8. I predict that I will perform well in this class. (i.e., get a good grade)

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

9. The class will contribute to building my skills as a student.

Strongly disagree		disagree		Somewhat disagree		Somewhat agree		agree		Strongly agree
1		2		3		4		5		6

10. I would be comfortable with a male professor teaching this class.

Strongly disagree		disagree	Somewhat disagree	Somewhat agree	agree	Strongly agree
1		2	3	4	5	6

11. I would be comfortable with a female professor teaching this class.

Strongly disagree		disagree	Somewhat disagree	Somewhat agree	agree	Strongly agree
1		2	3	4	5	6

12. The format of the class reflects what I expect to encounter in my career.

Strongly disagree		disagree	Somewhat disagree	Somewhat agree	agree	Strongly agree
1		2	3	4	5	6

13. I feel that all classes should be taught and graded this way.

Strongly disagree		disagree	Somewhat disagree	Somewhat agree	agree	Strongly agree
1		2	3	4	5	6

Please provide the following information.

Age _____

Sex _____

Major _____

Credit hours completed to date (estimated) _____

I am a pilot (circle one) yes no

If "no" for last, do you plan on becoming a pilot? yes no

For purposes of the following question, bias is defined as “unfair” treatment.

As a student, have you experienced, or have you witnessed any bias in the classroom?

If yes, please give a brief explanation.

Appendix C

Informed Consent

Study Conducted by Eric M. Moyer
Chair: Christina Frederick-Recasino, PhD.
Embry Riddle Aeronautical University
Human Factors and Systems
Daytona Beach, FL. 32114

The study you are about to participate in is designed to measure student preferences for classroom teaching method. The experiment consists of a single, 15-minute session. You will be asked to read a class syllabus, and then answer two questionnaires, one pertaining to that syllabus, and the other pertaining to yourself. You will also be asked to provide some general demographic information. Please do not communicate with other participants, or read other participant's material while the study is being conducted.

There are no known risks associated with this experiment. Please be assured that any information you provide will be held in strict confidence by the researcher and at no time will your name be reported along with your responses. Please understand that your participation in this research is voluntary and you may withdraw at any time. If you wish, you may receive a report of the results of this study upon completion please. Thank you for participating. If you have any questions, please ask during the experiment, or call Eric Moyer at (505)-306-2175.

Statement of Consent

I acknowledge that I have been informed of the general purpose of this study. I acknowledge that my participation in this study is entirely voluntary and I am free to withdraw at any time.

Signature of Participant: _____ Date: _____

I would like to receive a report of results for this experiment: yes: _____ no: _____

Appendix D**Debriefing Form**

Study Conducted by Eric M. Moyer
Chair: Christina Frederick-Recasino, PhD.
Embry Riddle Aeronautical University
Human Factors and Systems
Daytona Beach, FL. 32114

The study you just participated in was designed to measure student preferences for classroom teaching method. Three different, fictional syllabi were used to describe three different classroom-teaching methods. The three teaching methods were competitive, individual, and collaborative. Difference ranged from professors philosophy, to the grading format of the classes. Both questionnaires are identical for all participants, and designed to measure student preferences for three major areas of concern including, philosophy, grading, student interaction, and personality. The researcher is seeking evidence supporting the notion that students will prefer certain classroom teaching methods over others.

It is a hope of the researcher that findings will support future efforts to provide more student oriented classroom learning environments, and to provide faculty, and staff of universities a more clear picture of student expectations for the classroom. Each learning method has its pros and cons, and can be rationalized into a general life schema, but it is believed that university students will prefer certain methods over others.

Signature of Participant: _____

Date: _____